

Coordination Chemistry

配 位 化 学

敬爱的申泮文教授

就我在1979年11月13—24日，在南开大学讲课之际，请接受
此书为你大学的学生们使用。

此致良好祝愿

弗瑞德·巴索罗

Coordination Chemistry

The Chemistry of Metal Complexes

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Northwestern University

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配位化学

金属配合物的化学

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Dedication

This book is dedicated to Professor John Christian Bailar, Jr, our professional father and grandfather. Through his research and his training of students Professor Bailar is in large part responsible for the development of coordination chemistry in America.

题 词

此书献给专家老前辈约翰·克利斯欣·贝拉教授 (John Christian Bailar)。由于他的研究工作和对大学生的教育工作，贝拉教授对美国的配位化学的发展起着重要的作用。

译者序

美国科学院院士西北大学化学系教授 F·巴索罗博士于1979年11月13—24日应邀来我国到南开大学讲学，在此期间，巴索罗教授十分诚挚友好地将他和 L·蒋逊 合著的《配位化学》十册分赠给我国十个大学化学系，并委托我们将此书译成中文，供我国各校化学系师生使用。这本《配位化学》文字通畅，内容简明扼要，不仅可以作为大学生学习基础无机化学知识的课外参考读物，而且还可以用为专业英语的读本。因此我们把它编译成为英汉对照本，希望它能起到既作参考书又作专业英语读本的双重作用。在1980学年度已在教育部委托南开大学主办的“无机化学教学讨论班”上试用过，取得了较好的效果。

我们十分珍惜巴索罗教授对中国人民的诚挚友好情谊，并对他的赠书和同意我们翻译出版此书表示衷心地感谢。参加本书翻译工作的有南开大学化学系无机化学教研室的教师宋银柱、王耕霖、张若华、姜宗惠、姚心侃和阎世平同志，并由申泮文同志作最后复核。由于译者水平所限，错误在所难免，恳望读者不吝指正为谢。

译者

1980年12月

Editor's Foreword

THE TEACHING OF GENERAL CHEMISTRY to beginning students becomes each day a more challenging and rewarding task as subject matter becomes more diverse and more complex and as the high school preparation of the student improves. These challenges have evoked a number of responses; this series of monographs for general chemistry is one such response. It is an experiment in the teaching of chemistry which recognizes a number of the problems that plague those who select textbooks and teach chemistry. First, it recognizes that no single book can physically encompass all the various aspects of chemistry that all instructors collectively deem important. Second, it recognizes that no single author is capable of writing authoritatively on *all* the topics that are included in everybody's list of what constitutes general chemistry. Finally, it recognizes the instructor's right to choose those topics that he considers to be important without having to apologize for having omitted large parts of an extensive textbook.

This volume, then, is one of approximately fifteen in the General Chemistry Monograph Series, each written by one or more highly qualified persons very familiar with the current status of the subject by virtue of research in it and also conversant with the problems associated with teaching the subject matter to beginning students. Each volume deals broadly with one of the subdivisions of general chemistry and constitutes a complete entity, far more comprehensive in its coverage than is permitted by the limitation of the standard one-volume

编者前言

由于高中学生水平的提高和大学普通化学的内容越来越多样性和越来越复杂，从事大学一年级学生的普通化学教学工作就成为日益承受挑战和应给予褒奖的工作。这种挑战已经引起了许多反响，这一套普通化学专题丛书便是这种反响之一。这项工作足化学教学中的一项实验，它承认有许多问题会给教师们在选择教科书和讲授化学当中造成了困难。首先，它承认不会有一本单一的教本可以把所有教师都认为重要的化学各方面问题都包括在内。其次，它承认不会有一位单一的著者能够权威性地写好一本能够满足各个人要求的普通化学。最后，它承认教师有权选择他认为重要的题材，而无须对他省略了一本大部头教科书中的一大部分而表示歉意。

本书是总数约为15册的一套普通化学专题丛书之一，每一册是由一位或几位高水平的人士所撰写，这些人士由于在该领域中的研究工作而对该项题材的现状极为熟悉，并且他们对给大一学生讲授该专题材料时所出现的问题也是熟知的。在每一卷中广泛地讨论了普通化学中的一个专门问题并构成了一个完整的实体，它所包括的内容比标准的一卷本教科书所能包括的有限内容

text. Taken together, these volumes provide a range of topics from which the individual instructor can easily select those that will provide for his class an appropriate coverage of the material he considers most important.

Furthermore, inclusion of a number of topics that have only recently been considered for general chemistry courses, such as thermodynamics, molecular spectroscopy, and biochemistry, is planned, and these volumes will soon be available. In every instance a modern structural point of view has been adopted with the emphasis on general principles and unifying theory.

These volumes will have other uses also, selected monographs can be used to enrich the more conventional course of study by providing readily available, inexpensive supplements to standard texts. They should also prove valuable to students in other areas of the physical and biological sciences needing supplementary information in any field of chemistry pertinent to their own special interests. Thus, students of biology will find the monographs on biochemistry, organic chemistry, and reaction kinetics particularly useful. Beginning students in physics and meteorology will find the monograph on thermodynamics rewarding. Teachers of elementary science will also find these volumes invaluable aids to bringing them up to date in the various branches of chemistry.

Each monograph has several features which make it especially useful as an aid to teaching. These include a large number of solved examples and problems for the student, a glossary of technical terms, and copious illustrations.

The authors of the several monographs deserve much credit for their enthusiasm which made this experiment possible. Professor Rolfe Herber of Rutgers University has been of invaluable assistance in the preparation of

更为综合广泛。这些卷丛书总合在一起提供了一套专题，各位教师可以容易地从中选出一些他认为重要的材料，给他的班上供给合适教材内容。

此外，本丛书正在计划列入为普通化学课程新近才考虑的一些专题，例如热力学，分子波谱学和生物化学，这些卷书不久将会出版。在每一卷书中都采用了近代的结构观点，同时把重点放在一般原理和统一的理论上。这些卷书也还会有其他的用途：这些专著可用于丰富传统课程的学习内容，并为标准教科书提供现成易得的补充材料。在物理和生物科学等其他领域的学生，由于他们的专业兴趣，他们对于有关的任何化学领域的补充知识是有所需求的，这些专著对他们会是有价值的。例如，生物学的学生将会发现生物化学，有机化学和反应动力学的专题对他们特别有用的。物理学和气象学的大一学生将会发现热力学专题对他们是有益的。基础科学的教员们将也会发现这些卷书是宝贵的助具，可以使他们在化学各分支学科方面的知识现代化。

每一卷书都有若干特色而使它在教学当中作为一种助具是特别有用的。这些特色包括给学生提供的大量已解答的例题和作业，一份科技术语的词汇和丰富的插图等。

若干卷的著者值得我们予以推崇，由于他们的热情使本项实验成为可能。Rutgers 大学的 Rulfe Heber 教授在编辑本丛书时

this series, having supplied editorial comment and numerous valuable suggestions on each volume. Thanks are also due to Professor M. Kasha of the Florida State University for many suggestions during the planning stages and for reading several of the manuscripts.

RUSSELL JOHNSEN

Tallahassee, Florida
October 1962

提供了宝贵的帮助，他对每卷书提出了编辑评论和许多宝贵的建议。也应该感谢 Florida 州立大学的 Mkasha 教授，他在本丛书的设计阶段提出了许多建议，并且通读了若干卷的原稿。

Russell Johnsen

Tallahassee, Florida

1962年10月

Preface

COORDINATION CHEMISTRY is primarily concerned with metal complexes, but many of its concepts are applicable to chemistry in general. Beginning students, therefore, will profit from an appreciation and understanding of the basic principles of coordination chemistry, which may later be applied in more sophisticated fashion in advanced courses.

Although textbooks of general chemistry usually contain brief treatments of metal complexes and coordination chemistry, their limited space precludes the discussion of many of the important aspects of the subject. This being so, the present book was written to supplement the material now available on the subject to freshman chemistry students. The authors believe that the material presented will also be of value to students in junior-senior level courses in inorganic chemistry.

Modern theoretical concepts as applied to metal complexes are used. At first glance, such an approach may seem more difficult and confusing than a somewhat more traditional treatment. However, it is our experience that beginning students are able to grasp these concepts, thus making it easier for them to understand the material as presented in advanced courses. The valence bond theory is mentioned only briefly, whereas the crystal field and molecular orbital theories are discussed in considerable detail. These theories are used to explain the stability and lability of metal complexes. Current theories of reaction mechanisms are also included.

The authors would appreciate both suggestions for

著 者 序

配位化学的主要研究对象是金属配合物，但它的许多概念一般都可以应用于整个化学中。因此，大一学生将可以从对配位化学基本原理的学习和理解而受到益处，这些基本原理将来在高年级课程中将会得到更完善的应用。

虽然普通化学的教科书中往往包含有对金属配合物和配位化学的简略处理，但它们的有限篇幅使它们不可能对配位化学的许多重要方面进行讨论。由于这种原因，本书的编写目的就是给大一化学学生就配位化学提供一些现有的补充材料。著者相信本书中提供的材料对于高年级无机化学课程的学生也是有价值的。

本书采用了能应用于金属配合物的一切近代理论概念。初一看来，这种理论处理同多少是比较传统的处理方式相比可能是比较难和比较乱。不过根据我们的经验，大一学生是能够掌握这些概念的，这样就可以使它们能比较容易地去理解高年级课程中提供的材料了。本书中仅简单地提到价键理论，但对晶体场理论和分子轨道理论则进行了较详细的讨论。这些理论用于解释金属配合物的稳定性和易变性。书中也包括了反应机理的近代理论。

著者将对改进本书的建议和学生对本书的反映意见的报告表

the improvement of the book and reports of student reaction toward it. We wish to thank Dr S A Johnson, who read the entire manuscript and made many helpful suggestions. One of us (F B) wishes to thank Dr. V. Caglioti and the people in his Institute at the University of Rome, where part of the original writing of this book was done, for their generous help and hospitality.

FRED BASOLO
Evanston, Illinois
July. 1964

RONALD C JOHNSON
Atlanta, Georgia

示感谢。我们愿对 S. A. Johnson 博士表示感谢，他通读了全部手稿并提出了许多有益的建议。著者之一 (F.B.) 愿对 V Caglioti 博士和他在罗马大学的研究所中所有人士的慷慨帮助和殷勤款待表示感谢，本书的部分原稿就是在那里写成的。

FRED BASOLO

Evanston, Illinois

RONALD C JOHNSON

Atlanta, Georgia

1964年7月

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